Docket No. AUS920010218US1

DRAG AND DROP TECHNIQUE FOR BUILDING QUERIES

BACKGROUND OF THE INVENTION

1. Technical Field:

The present invention relates to an improved data processing system. More particularly, the present invention provides a method and system for building queries and, still more particularly, a method and system for building queries using a drag and drop technique.

2. Description of Related Art:

Many data processing systems take advantage of distributed processing by using a client/server architecture. In this architecture, the database is divided into two parts: a front-end or a client portion, and a back-end or a server portion. The client portion concentrates on requesting, processing, and presenting data managed by the server portion. The server portion runs server software and handles the functions required for concurrent, shared data access. Of course, the client-server architecture can be distributed across a network. For example, each of the client applications may be executed at a different node of the network, while one or more other nodes on the network are used for storing the database and executing the server software to process database requests sent by users at the client nodes.

To request data from a database, a client application may have a query written in any number of

programming languages. One such language is the industry standard Structured Query Language(SQL) defined by the International Standards Organization (ISO). In response to executing the client application, the client will cause the server portion to perform the required operations on the information in the database.

Queries can be built manually from typing SQL commands or using graphical user interfaces (GUIs) to select conditions, their associated values and the logical expressions that form the query sequence. Once built, the query is run and the results of the query are returned so that a user can act upon the results. Typically queries are run in order to reduce a very large population of data down to a much smaller, or manageable population of data.

However, building queries from GUIs can be difficult and time consuming. Typically, the user has to understand the properties of the object such as an Internet Protocol (IP) address or a machine type, and then build a series of statements using logical operators such as AND, OR, NOT, and LIKE to reduce the query results to a manageable query results set. Typically, many end users of computer systems are not highly skilled in the art of programming and technical logic. The end user's main goal is to accomplish a task rather than to understand the underpinnings of an application or program. The more a design matches well-established principles of dragging and dropping and selecting highly recognizable attributes of objects, the higher the likelihood that the user will be able to understand and complete the task at hand. Therefore, the use of SQL

logic to conduct a search is an abstract notion to many end users. The use of SQL logic often inserts itself between the steps of planning what objects the user is attempting to match and the steps of actually carrying out the search for those attributes. As a result, when an end user does not understand SQL, the end user is often forced to either run a simple search that may return too many objects or spend valuable time attempting to learn the aspects of a SQL search. There exists a need for allowing a user to build a query, not by having to enter SQL type commands or even to use GUI controls to build a query syntax, instead by a user being able to use a simpler and more efficient technique.

Therefore, it would be advantageous to have a method and system for building a query using a simple drag and drop technique.

SUMMARY OF THE INVENTION

The present invention provides a method, system and computer program product for building a search query in a data processing system having a graphical user interface. Responsive to user input, a graphical component representing a first system object is dropped onto a graphical component representing a query function. A set of attributes of the first system object is presented. Responsive to user selection, a search query is created from the selected set of attributes.

BRIEF DESCRIPTION OF THE DRAWINGS

The novel features believed characteristic of the invention are set forth in the appended claims. The invention itself, however, as well as a preferred mode of use, further objectives and advantages thereof, will best be understood by reference to the following detailed description of an illustrative embodiment when read in conjunction with the accompanying drawings, wherein:

Figure 1 is a pictorial representation of a distributed data processing system in which the present invention may be implemented;

Figure 2 is a block diagram of a data processing system that may be implemented as a server in accordance with a preferred embodiment of the present invention;

Figure 3 is a block diagram illustrating a data processing system in which the present invention may be implemented;

Figure 4 is an exemplary list of objects in accordance with a preferred embodiment of the present invention;

Figure 5 shows an object chosen with a drag and drop technique from the list of objects in **Figure 4** in accordance with a preferred embodiment of the present invention;

Figure 6 is an exemplary graphical user interface (GUI) presenting a choice of properties for a query search in accordance with a preferred embodiment of the present invention;

Figure 7 shows results of a query search in accordance with a preferred embodiment of the present invention; and

Figure 8 is a flowchart illustrating an exemplary drag and drop technique for building queries in accordance with a preferred embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

With reference now to the figures, **Figure 1** depicts a pictorial representation of a distributed data processing system in which the present invention may be implemented. Distributed data processing system **100** is a network of computers in which the present invention may be implemented. Distributed data processing system **100** contains a network **102**, which is the medium used to provide communications links between various devices and computers connected together within distributed data processing system **100**. Network **102** may include permanent connections, such as wire or fiber optic cables, or temporary connections made through telephone connections.

In the depicted example, a server **104** is connected to network **102** along with storage unit **106**. In addition, clients **108**, **110**, and **112** also are connected to network **102**. These clients **108**, **110**, and **112** may be, for example, personal computers or network computers. For purposes of this application, a network computer is any computer, coupled to a network, which receives a program or other application from another computer coupled to the network. In the depicted example, server **104** provides data, such as boot files, operating system images, and applications to clients **108-112**. Clients **108**, **110**, and **112** are clients to server **104**. Distributed data processing system **100** may include additional servers, clients, and other devices not shown. In the depicted example, distributed data processing system **100** is the Internet with network **102** representing a worldwide collection of networks and

gateways that use the TCP/IP suite of protocols to communicate with one another. At the heart of the Internet is a backbone of high-speed data communication lines between major nodes or host computers, consisting of thousands of commercial, government, educational and other computer systems that route data and messages. Of course, distributed data processing system **100** also may be implemented as a number of different types of networks, such as for example, an intranet, a local area network (LAN), or a wide area network (WAN). **Figure 1** is intended as an example, and not as an architectural limitation for the present invention.

Figure 2 is a block diagram of a data processing system that may be implemented as a server in accordance with a preferred embodiment of the present invention. **Figure 2** may be implemented as a server, such as server **104** in **Figure 1**. Data processing system **200** may be a symmetric multiprocessor (SMP) system including a plurality of processors **202** and **204** connected to system bus **206**. Alternatively, a single processor system may be employed. Also connected to system bus **206** is memory controller/cache **208**, which provides an interface to local memory **209**. I/O bus bridge **210** is connected to system bus **206** and provides an interface to I/O bus **212**. Memory controller/cache **208** and I/O bus bridge **210** may be integrated as depicted.

Peripheral component interconnect (PCI) bus bridge **214** connected to I/O bus **212** provides an interface to PCI local bus **216**. A number of modems may be connected to PCI bus **216**. Typical PCI bus implementations will support

four PCI expansion slots or add-in connectors. Communications links to network computers **108-112** in **Figure 1** may be provided through modem **218** and network adapter **220** connected to PCI local bus **216** through add-in boards.

Additional PCI bus bridges **222** and **224** provide interfaces for additional PCI buses **226** and **228**, from which additional modems or network adapters may be supported. In this manner, data processing system **200** allows connections to multiple network computers. A memory-mapped graphics adapter **230** and hard disk **232** may also be connected to I/O bus **212** as depicted, either directly or indirectly.

Those of ordinary skill in the art will appreciate that the hardware depicted in **Figure 2** may vary. For example, other peripheral devices, such as optical disk drives and the like, also may be used in addition to or in place of the hardware depicted. The depicted example is not meant to imply architectural limitations with respect to the present invention.

The data processing system depicted in **Figure 2** may be, for example, an IBM eServer pSeries system, a product of International Business Machines Corporation in Armonk, New York, running the Advanced Interactive Executive (AIX) or Linux operating system.

Figure 3 is a block diagram illustrating a data processing system in which the present invention may be implemented. Data processing system **300** is an example of a client computer. Data processing system **300** employs a peripheral component interconnect (PCI) local bus

architecture. Although the depicted example employs a PCI bus, other bus architectures such as Accelerated Graphics Port (AGP) and Industry Standard Architecture (ISA) may be used. Processor **302** and main memory **304** are connected to PCI local bus **306** through PCI bridge **308**. PCI bridge **308** also may include an integrated memory controller and cache memory for processor **302**. Additional connections to PCI local bus **306** may be made through direct component interconnection or through add-in boards. In the depicted example, local area network (LAN) adapter **310**, SCSI host bus adapter **312**, and expansion bus interface **314** are connected to PCI local bus **306** by direct component connection. In contrast, audio adapter **316**, graphics adapter **318**, and audio/video adapter **319** are connected to PCI local bus **306** by add-in boards inserted into expansion slots. Expansion bus interface **314** provides a connection for a keyboard and mouse adapter **320**, modem **322**, and additional memory **324**. Small computer system interface (SCSI) host bus adapter **312** provides a connection for hard disk drive **326**, tape drive **328**, and CD-ROM drive **330**. Typical PCI local bus implementations will support three or four PCI expansion slots or add-in connectors.

An operating system runs on processor **302** and is used to coordinate and provide control of various components within data processing system **300** in **Figure 3**. The operating system may be a commercially available operating system, such as Windows 2000, which is available from Microsoft Corporation. An object oriented programming system such as Java may run in conjunction with the

operating system and provides calls to the operating system from Java programs or applications executing on data processing system **300**. "Java" is a trademark of Sun Microsystems, Inc. Instructions for the operating system, the object-oriented operating system, and applications or programs are located on storage devices, such as hard disk drive **326**, and may be loaded into main memory **304** for execution by processor **302.**

Those of ordinary skill in the art will appreciate that the hardware in **Figure 3** may vary depending on the implementation. Other internal hardware or peripheral devices, such as flash ROM (or equivalent nonvolatile memory) or optical disk drives and the like, may be used in addition to or in place of the hardware depicted in **Figure 3**. Also, the processes of the present invention may be applied to a multiprocessor data processing system.

For example, data processing system **300**, if optionally configured as a network computer, may not include SCSI host bus adapter **312**, hard disk drive **326**, tape drive **328**, and CD-ROM **330**, as noted by dotted line **332** in **Figure 3** denoting optional inclusion. In that case, the computer, to be properly called a client computer, must include some type of network communication interface, such as LAN adapter **310**, modem **322**, or the like. As another example, data processing system **300** may be a stand-alone system configured to be bootable without relying on some type of network communication interface, whether or not data processing system **300** comprises some type of network communication interface. As a further

example, data processing system **300** may be a Personal Digital Assistant (PDA) device, which is configured with ROM and/or flash ROM in order to provide non-volatile memory for storing operating system files and/or user-generated data.

The depicted example in **Figure 3** and above-described examples are not meant to imply architectural limitations. For example, data processing system **300** also may be a notebook computer or hand held computer in addition to taking the form of a PDA. Data processing system **300** also may be a kiosk or a Web appliance.

The present invention provides a method for building queries using a drag and drop technique. An empty folder may be created. Objects may be located by find or navigation techniques. These located objects are dropped into the empty folder. Once complete, specific objects may be selected and may indicate which particular type of object is needed for further investigation.

For example, a folder named "hard to manage workstations" may be created. A search for workstations that are known to experience problems may begin. Problematic workstations may be dragged and dropped into the folder named "Hard to manage workstations". An object may be selected within the folder by, for example, right clicking on the object with an input device, such as, for example a mouse, and indicating that this object is used as a "template." A GUI may ask for which property of the selected object is to be used for a query. For example, the operating system of the selected object may be chosen. A "build query" option may then be

chosen. Software associated with the present invention may then search, for example, each server or each managing server and locate every machine that has the same operating system as the selected object and populate the folder with, for example, all workstations which have that particular operating system on them. Increasingly more complex queries may be built with the present invention by continuing to add other objects into the folder. Furthermore, selecting other properties of those collected objects as desired may be used to build additional queries.

Figure 4 is an exemplary list of objects in accordance with a preferred embodiment of the present invention. A directory tree, such as directory tree **402**, may contain a large number of folders. Inside each folder within directory tree **402**, may be, for example files **404** associated with each particular folder or additional folders, such as, for example "prints" folder **406**. In the prior art, searching each folder within directory tree **402** may be difficult and further difficulty may be encountered when a specific characteristic is needed for files within each folder. However, the present invention is directed toward solving this problem as discussed in detail below..

Figure 5 shows an object chosen with a drag and drop technique from the list of objects in **Figure 4** in accordance with a preferred embodiment of the present invention. To avoid the difficulties associated with searching each folder individually or using, for example, an SQL command to search directory tree **402** in **Figure 4**,

a file within a folder may be, for example, dragged and dropped into a query template, such as, for example, query template **504**. In this example "Windows 95 Workstation" file **502** has been dragged and dropped into query template **502**.

Figure 6 is an exemplary graphical user interface (GUI) presenting a choice of properties for a query search in accordance with a preferred embodiment of the present invention. After being inserted into a query template either by, for example, a drag and drop technique as shown in **Figure 5**, properties of the file may be presented. Properties of the file may be presented in, for example, Windows 95 Workstation Properties display **600**. Windows 95 Workstation Properties display **600** may consist of a file name, such as Windows 95 Workstation file **502** chosen in **Figure 5**. In addition, Windows 95 Workstation Properties display **600** may include attributes associated with Windows 95 Workstation **502** from which a user may select attributes that in turn generate a query. The query compares all attributes selected by the user to match attributes of objects in a system. The query may, for example search within a folder, search within a network, search within an organizations' machines, and the like. Attributes which are matched based on the comparison are returned to be included in, for example, query template **504** in **Figure 5**. In this example, attributes **602** contain features such as machine type **604**, location **606**, service patch **608** and operating system **610**. In this example, location **606** has been selected by the user to be included in the query.

Furthermore, attributes **602** may include a variety of properties, such as properties **612**, which may be associated with Windows 95 Workstation **502**. As with machine type **604**, location **606**, service path **608** and operating system **610**, these properties are properties which may be associated with Windows 95 Workstation **502**. In this example, Property2 **614** and Property7 **616** have been chosen to be included in the query. Property2 **614** and Property7 **616** may be, respectively, for example, a specific version of an application and a certain subsystem component, defining a certain problem associated with, for example, Windows 95 Workstation **502**, and the like. Once attributes **602** are selected for Windows 95 Workstation **502**, a query may be executed by selecting "run query" virtual button **622** or "Windows 95 Workstation Properties" **600** may be canceled by selecting cancel virtual button **624**. Although **Figure 6** has shown one specific implementation of presenting a choice of properties for a query search, alternative panels may also be used. For example, a first sample panel may be presented with the most frequently used search terms. Selection of an "advanced" item may present additional panels presenting additional attributes of the object. Those skilled in the art would appreciate that other examples may be used in carrying out the processes of the present invention.

Figure 7 depicts results of a query search in accordance with a preferred embodiment of the present invention. Results of the query may be inserted into a

query template, such as, for example, query template **504** shown in **Figure 5**. Query template **504** contains original Windows 95 Workstation file **502**, either dragged and dropped or selected from a context menu from a list of objects. Entries **702-722** contain features similar to Windows 95 Workstation **502** as defined in "Windows 95 Workstation Properties" **600** in **Figure 6**. With the use of the present invention only files containing features similar to those selected in the "Windows 95 Workstation Properties" panel **600** are included in query template **504**.

In this example, Windows 95 Workstation **502** is selected to be included in the search query. Objects containing a specific attribute or attributes matching those in Windows 95 Workstation **502** may also be included in query template **504**. For example, Windows 95 Workstation **502** may use, for example, a particular operating system. Once Windows 95 Workstation **502** is selected and a operating system used by Windows 95 Workstation **502** is specified, the search query will return objects also using, for example, the particular operating system. In this example, the search query has returned Windows 95 NYC-1 **702**, Windows 95 NYC-2 **704**, Windows 95 NYC-3 **706**, Windows 95 NYC-4 **708**, Windows 95 NYC-5 **710**, Windows 94 NYC-88 **712**, Windows 95 NYC-102 **714**, Windows NYC-44 **716**, Windows 95 NYC-55 **718**, Windows 95 NYC-122 **720** and Windows 95 NYC-105 **722** which also use the particular operating system specified for Windows 95 Workstation **502** and these objects are included in query template **504**. It should also be noted that Windows 95

Workstation **502** is also included in query template **504** because, of course, Windows 95 Workstation **502** also uses the specified operating system.

Figure 8 is a flowchart illustrating an exemplary drag and drop technique for building queries in accordance with a preferred embodiment of the present invention. In this example, the operation start by receiving a request to run a query (step **802**). Then a property identification is received (step **804**). A property identification may be a characteristic of a subsystem on a data processing system, a problem associated with a subsystem on a data processing system, and the like. Then a representative GUI object is received by a find function (step **806**). The find function attempts to locate objects with a property or properties similar to the received property identification. Then a determination is made as to whether or not to drag an object into a template search folder (step **808**). If an object is not to be dragged into a template search folder (step **808:NO**), then a search for an object is performed. The object is then located (step **814**). A new search folder is created (step **816**) and the located object is placed in the search folder (step **818**). Then the operation continues to step **820** in which a selection of a representative GUI object is received.

Returning to step **808**, if the object is to be dragged into a template search folder (step **808:YES**), then instructions are received to drag a representative GUI object into a template search folder (step **810**). A

selection of the representative GUI object is received (step **820**). Properties are displayed for the representative GUI object (step **822**). A selection is received for appropriate properties for the representative GUI object (step **824**). Query instructions are received (step **826**) and the search query is constructed (step **828**). The query search is run (step **830**). Query results of objects are returned to the folder that match the template object selected properties (step **832**). Then a determination is made as to whether or not another query is to be run (step **834**). If another query is not to be run (step **834:NO**), the operation terminates. If another query is to be run (step **834:YES**), the operation returns to step **804** in which a property determination is received.

Therefore, the present invention provides a method for building a query using a simple drag and drop technique. An object is located and then used as a reference so as to locate other objects within a data processing system containing similar characteristics. The object is dropped into a folder which is used as a template to locate the other objects with similar characteristics. A query is run and objects with similar characteristics are identified and also inserted into the folder. This process reduces the amount of time and knowledge of search techniques in which to locate objects with similar characteristics.

It is important to note that while the present invention has been described in the context of a fully functioning data processing system, those of ordinary

skill in the art will appreciate that the processes of the present invention are capable of being distributed in the form of a computer readable medium of instructions and a variety of forms and that the present invention applies equally regardless of the particular type of signal bearing media actually used to carry out the distribution. Examples of computer readable media include recordable-type media such as a floppy disc, a hard disk drive, a RAM, and CD-ROMs and transmission-type media such as digital and analog communications links.

The description of the present invention has been presented for purposes of illustration and description, but is not intended to be exhaustive or limited to the invention in the form disclosed. Many modifications and variations will be apparent to those of ordinary skill in the art. The embodiment was chosen and described in order to best explain the principles of the invention, the practical application, and to enable others of ordinary skill in the art to understand the invention for various embodiments with various modifications as are suited to the particular use contemplated.